

BRING YOUR OWN DEVICE

Preparing for the influx of mobile computing devices in schools

Executive Summary

Two-thirds of IT managers surveyed for CDW-G's 2011 *21st Century Classroom Report* said that their districts plan to upgrade or improve classroom technology by the end of 2013. Yet, nearly half of them had to cope with smaller budgets in 2011 and will likely face similar constraining circumstances going forward.

Thanks to the mass consumerization of technology, K-12 students are now some of the most enthusiastic and savvy users of state-of-the-art mobile computing devices. And they're not just using them to communicate with friends or download music. The *21st Century Classroom Report* showed that 94 percent of high school students use technology to study or work on homework assignments, and the same high percentage believe that learning and mastering the latest technology skills will improve their educational and career opportunities.

At the convergence of these two realities, a growing number of school districts recognize an opportunity to make the most of the technology already in students' hands. Rather than telling students to leave their devices at home, some schools are allowing them to use the technology with which they feel most comfortable – namely, their own notebooks, tablets and smartphones – in class.

The concept, widely known as "bring your own device" (BYOD), is a variant of one-to-one computing whose time has come, advocates say.

Districts with active BYOD programs report that students are using their personal devices to take notes, collaborate on class assignments, conduct Internet research and use cloud-based academic applications. One example, Katy (Texas)

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**TWEET THIS!**

Independent School District, an early BYOD adopter, has seen increased learning outcomes and test scores, while other BYOD friendly districts say their students are more engaged in learning activities.

Still, a BYOD initiative requires a lot more than just reversing a ban on such devices. Schools must dedicate significant resources to planning and building a robust wireless network (or upgrading an existing one). And they must begin addressing security concerns along with creating acceptable-use policies that ensure students understand the rules of responsible computing, including the consequences of breaking those rules.

Also equally important are effectively incorporating these devices into the curriculum and maximizing their value in the classroom, as well as implementing appropriate professional development programs for staff.

Why Implement a BYOD Initiative

Schools are working hard to provide their students with technology-enhanced learning, but at the moment they're falling short. The *21st Century Classroom Report* found that 86 percent of students use technology more outside of school than they do in class. A major reason is access. Although many schools provide notebook carts and computer labs, students often have to leave the classroom and go to another part of the school to use a computer or share time with other students.

A BYOD initiative overcomes this access hurdle, much as one-to-one computing programs do, but without the capital costs associated with purchasing the technology or the need to refresh, support and train users. With BYOD, students are responsible for figuring out and fixing their own devices.

Schools that have embraced BYOD are enjoying other benefits as well:

Schools meet students' "digital expectations." The current generation of students has grown up with technology and want to use it in every aspect of their daily lives – including school. They have an expectation that the same technology they use at home will be available at school.

Schools invested heavily in classroom and mobile learning technologies recognize this demand and are trying to meet it. Unfortunately, it's not happening everywhere, as the *21st Century Classroom Report* reveals: Just 39 percent of high school students said that their school is currently meeting their technology expectations.

Student participation increases. Students like using their personal devices, so they become engaged in whatever it is that they're doing with them – including classwork, which becomes even more interactive when everyone has access to technology. Unlike a school-provided device, the personal device (and the desire to continue using it) goes home with the student. In this way, BYOD enables and fosters 24x7 learning.

Getting Teachers In Tune

Teachers often are wary of BYOD programs because they fear losing control of their classrooms. Help them make the most of these technology assets by recommending these strategies:

- **Communicate thoroughly and explicitly.** At the outset explain how devices will be used in the classroom and incorporated into the curriculum. Teachers also should devote plenty of class time to answering questions or concerns that students have and continue to manage student expectations about technology use throughout the school year.
- **Emphasize their role as teachers.** Teachers are not IT support staff. If students have trouble with their devices, teachers shouldn't spend valuable class time trying to help. Instead, they should consider allowing students to consult with their more tech-savvy classmates. In many cases, students may be able to figure it out together.
- **Seek guidance.** Look to other teachers, technology integration specialists and librarians for ideas on how to incorporate digital content and technology functions into the curriculum. Encourage students to suggest ways to turn a nontechnology assignment into a technology-enhanced one.
- **Plan group projects.** This will bring together students with different devices – helping them learn and leverage the unique strengths of different platforms.

Student collaboration and communication increases.

According to the *21st Century Classroom Report*, 59 percent of students use technology to communicate with other students and 14 percent use it to communicate with teachers – but just 23 percent leverage its potential for collaboration.

A BYOD initiative, paired with the development of web-based learning management systems, class-specific social networking spaces and academic applications, can provide students with far greater opportunities to interact virtually with teachers, study with online tutors and work with other students on assignments, projects and content creation.

The digital divide is reduced. Instead of spending dollars to buy redundant learning devices for students who already own such tools, school IT departments can invest that money in devices for students who lack their own.

Preparing the Network

A BYOD initiative opens a school network to a glut of new, heterogeneous computing devices, so a robust wireless infrastructure is paramount to success. If the network doesn't have enough bandwidth or access points to accommodate this density or is frustratingly slow, a BYOD program will quickly falter.

This is where planning is critical: IT officials must predict not just the number of users and devices, but when and where students plan to use them. An adequate number and appropriate placement of wireless access points are crucial to ensure that students can access web resources when needed, says Rich Kaestner, a project director for the Consortium for School Networking (CoSN). As a rule of thumb, each access point can handle about 30 devices.

Most schools spend a year (or more) prior to a planned BYOD program preparing for this new reality. Brebeuf Jesuit Preparatory School in Indianapolis, for example, completely rebuilt its wireless network, replacing 801.11g access points with 802.11n and adding new access points to double its wireless capacity. To make sure it could handle sudden spikes in demand during the school day, Forsyth County (Ga.) Schools boosted bandwidth, bumping its wide area network speeds from 1 gigabit per second to 2Gbps in each building and from 500 megabits per second to 1.3Gbps for Internet access.

Officials at Deer Park (Texas) Independent School District also increased bandwidth speeds after discovering holes in the district's coverage during a BYOD trial run in fall 2010. When campus Wi-Fi networks became overwhelmed by the influx of student-owned devices seeking connectivity, Chief Technology Officer Kari Rhame Murphy and her team tweaked the location and number of access points in the network infrastructure.

Given that experience, Murphy advises all schools with BYOD initiatives to analyze their network capacity on a regular basis and to be prepared to upgrade equipment when needed.

Addressing Security Concerns

The idea of opening the network to well-traveled student devices that could very well be infected with viruses, malware and scareware is a frightening proposition for most school administrators. But it doesn't have to be.

Using virtualization along with internal and external firewalls, schools can cordon off a secure section of their WLAN, thereby ensuring that students never come in contact with any school databases or sensitive IT assets. At BYOD schools, students generally authenticate through the district portal onto a virtualized LAN (VLAN) that's been set up to handle student traffic. From there, they can go online, but their activities are monitored by a content filtering solution, which prevents them from accessing inappropriate content using school resources (as mandated by the Children's Internet Protection Act).

Forsyth County Schools offered students a choice in how they access the school network. They can go through the official portal or they can also utilize an open, public Wi-Fi network that was built specifically for student-owned devices. The latter approach negates any need for student authentication, which school officials felt was too time-consuming.

Cloud technologies allow schools to provide students with traditionally internal functions such as printing, storage and

A New Way of Learning

Incorporating student-owned mobile computing devices into the curriculum can help educators transform their direct instruction methods into project- and inquiry-based learning opportunities. This pedagogical approach helps students learn by doing and gives them ownership of their education, says Dr. Elliott Soloway, chair of the International Society for Technology in Education's Mobile Learning Special Interest Group and professor at the University of Michigan.

Schools can develop their own approaches by forming curriculum development teams led by teachers who are particularly interested in technology-enhanced education. Organizing round-table discussions and workshops in which teachers brainstorm, share stories and try out new ideas also can be effective.

Teaching students to learn by doing can be accomplished in a variety of ways, and curriculum development should be an ongoing process. But Soloway and other experts say that schools that pair this pedagogical approach with a BYOD program often see unprecedented increases in student engagement and achievement.

e-mail, without exposing their internal resources to online hazards. When Brebeuf students need to print something, the network routes them to Google Cloud Print. Deer Park ISD, meanwhile, is creating digital "lockers" in which students can store their electronic documents and project materials.

Viruses are an obvious concern, given that most student devices face potential exposure whenever they connect with social networking, gaming and other high-risk sites. BYOD adopters acknowledge this reality and keep viruses out of the student tunnel by programming the firewall to do quick scans during the authentication process, by educating students about the need to stay up to date with their virus programs and by implementing stringent device registration processes. As long as the VLAN routes students through a hardened tunnel out to the web, schools say, viruses cannot threaten school resources.

Best Practices

A BYOD initiative isn't a panacea. Murphy says Deer Park ISD's transition to BYOD was surprisingly easy, but only because she and her team spent nearly two years planning for it. To help ensure success, school leaders should consider some of the following best practices.

Seek buy-in. At present, most schools ban personal devices. Therefore, getting stakeholders to reverse course and welcome them into the learning environment can be difficult. It's incumbent upon BYOD advocates to convince their colleagues that BYOD won't result in students running amok in the classroom and clogging (or corrupting) the school network.

Explain the network and security safeguards, detail the financial and pedagogical benefits that BYOD-friendly schools have experienced, and show the concept in action by taking stakeholders to visit these early adopters.

CoSN's Kaestner advises starting slowly. A pilot program can demonstrate the benefits and help skeptical administrators and teachers overcome their preconceptions (and misconceptions) about BYOD. Rolling out a program in phases or on a voluntary basis (at least initially) also can help schools work out bugs.

Develop a "Responsible Use" policy. Putting the focus on student accountability makes for a more positive approach to what's essentially a trust-based contract, Deer Park ISD's Murphy says. The document, which needs to be signed by both students and their parents, should spell out the intent of the program, how students are expected to use their devices, what constitutes an infraction and the consequences of such behavior.

Train your teachers. With BYOD, teachers will no longer need "tools" training on specific hardware and software, but schools will still need to provide professional development. In particular, teachers will need guidance on how to manage their BYOD classrooms effectively and how to integrate technology-enabled learning into their curriculum.

Educate parents. According to Project Tomorrow, parents already recognize the value of personal devices in the classroom (see What's in Those School Bags? sidebar). But schools should seek their input early in the process of rolling out a BYOD program and provide educational materials about policies and expectations.

What's in Those School Bags?

High school students are most likely to own mobile devices, but many students in the lower grades also have personal access to such tools. The distribution is as follows:

Device	Grades K-2	Grades 3-5	Grades 6-8	Grades 9-12
Cell phone (no Internet access)	21%	29%	51%	56%
Smartphone	16%	19%	34%	44%
Notebook computer	37%	42%	60%	67%
MP3 player	37%	55%	79%	85%
Tablet device	10%	8%	13%	10%

SOURCE: Speak Up 2010 (Project Tomorrow)

Facilitate, but don't support. IT personnel can help students access the network and offer input on which device might best suit their needs. But they shouldn't be expected to fix broken devices or troubleshoot malfunctioning ones; leave those responsibilities to students and their parents.

Ensure equity. For BYOD to really bring value to the classroom environment, all students must have access to devices. But the reality is that some students won't have their own device or home Internet access. Schools with BYOD programs are solving this inequity using a variety of approaches. Some provide loaner devices from their own inventories, while others offer stipends to help families purchase a device or pay for broadband.

And then there are schools that simply give students their own devices. Officials at Brebeuf, for example, will buy devices for all students receiving financial aid when they roll out a mandatory BYOD program in fall 2012 – a gesture that CIO JD Ferries-Rowe says is consistent with the school's mission to advance social justice.

CDW-G's Mobility Solutions

CDW-G offers several services to support BYOD in schools:

Procurement and activation: CDW-G is an authorized partner with AT&T, Sprint and T-Mobile for the procurement and activation of devices. Through strategic partnerships, CDW-G can also activate selected devices with Verizon Wireless.

Securing and managing devices: CDW-G can provide multi-OS device management software including BlackBerry, iOS, Android, Windows Mobile, Symbian Device Security and Management. Partners include AirWatch, BoxTone, McAfee, MobileIron, RIM, Sybase and Symantec.

Supporting mobile solutions: CDW-G can help with in the following: building customized procurement portals, creating IT help desk Tier II and III support solutions, charge allocation and reporting, end user support, bill auditing, management and reconciliation, and asset tracking and inventory management.

Learn more about CDW-G's offerings and hear a mobile deployment story from one of CDW-G's Mobile Solutions Architects at CDWG.com/mobility – or contact your account manager.



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